evidence to prove the amount of influence attributable to each, I have contented myself with submitting these documents to notice. And if they move the curiosity of others to make further investigations, my highest purpose will be accomplished.

An Attempt to determine the Influence of the Seasons and Weather on Sickness and Mortality. By WILLIAM AUGUSTUS GUY, M. B. Cantab. Professor of Forensic Medicine, King's College, London, and Physician to King's College Hospital.

THE present enquiry was suggested by a striking coincidence observed in the recently published Report of the King's College Hospital for 1842, between the prevalence of sickness in the several seasons and the temperature. This led to an examination of the bills of mortality for the same year, in which a similar coincidence was observable between the temperature and the number of deaths in the several seasons.

A desire to ascertain whether these were mere coincidences, or the general rule of sickness and mortality, prompted an examination of the records of sickness and mortality in past years; and the results of this examination are embodied in the present communication.

This enquiry, then, consists of two parts. 1. As to the relation subsisting between the seasons and weather, and the amount of sickness and mortality, during the year 1842; and 2. A comparison of the results obtained for 1842 with those of former years.

The facts which form the basis of the first part of the enquiry are the Registrar-general's tables of mortality for the metropolis, for the year 1842, and the cases registered in the out-patient books of the King's College Hospital for the same year. The standard of comparison employed is the Meteorological Table, deduced from observations made at the apartments of the Royal Society, and appended to the Registrar-general's Report already mentioned.

It is necessary to premise that the King's College Hospital is situate in the western part of the central district of the metropolis, in the midst of the parishes of St. Clement's Danes, St. Giles in the Fields, St. Andrew's Holborn, and St. George's Bloomsbury; that in this central district nearly 375,000 persons occupy a space of less than three square miles; whilst in the eastern districts, about the same number of persons are comprised within little less than nine square miles. Hence the central districts are nearly three times as populous as any other district in London, and six times as populous as the northern, the southern, or the western districts. In consequence of the large population by which the hospital is surrounded, the applications for relief, which, from its first establishment, were very numerous, have been continually increasing, and amounted in the year 1842 to upwards of 12,000 cases, exclusive of casualties. This large number may be fairly presumed to represent the sickness of the more central parts of the metropolis.

In consequence of the registration of in-patients having been incomplete during the early part of the year 1842, the medical and surgical out-patients alone are made use of for the present enquiry; and as these are the class of patients who suffer from the diseases most influenced by the seasons and weather, they will form a fair representative of the prevalence of sickness, as contradistinguished from more severe diseases which tend to a mortal issue. The out-patients have amounted, during

the past year, to upwards of 11,000, and of these more than 9,000 are available for the present purpose.

The out-patients are seen every day, and they are not required to present letters of recommendation. Hence every facility is given for the attendance of patients, and the poor inhabitants of the immediate neighbourhood are not obliged to go to more remote hospitals or dispensaries for advice in those diseases which do not admit of delay. In consequence of this arrangement there is a strong probability that the prevalent diseases are fairly represented by the entries on the books.

It may be advisable further to state that the names of the several diseases have been entered upon the registers from the dictation of the physicians and surgeons attending the out-patients, who have been absent but rarely, and at short intervals, from their posts; and that upon such occasions their places have been supplied by persons fully competent to name, as well as to treat, the diseases which have come under their notice. The names of the several diseases have, therefore, been correctly given, and with perhaps an unusual degree of uniformity.

One other observation is necessary, viz. that the dates of the entries on the books are those of the patients' application to the hospital, and not of the commencement of their diseases. But this will have little effect on the general result, as most of those diseases which determine the amount of sickness at different periods date from a few days before the time of application for relief.

Having thus described the sources from which the materials of this paper are drawn, in order that their value as representing the prevalence of sickness during the year 1842 may be understood, I proceed to the subject matter of my enquiry.

The following Table exhibits for each quarter of the year the total mortality of the metropolis; the mortality of the central districts; and the sickness of that part of the central districts in which King's College Hospital is situate. The quarters are supposed to consist of three months of 31 days each; so that the numbers in the Table do not represent the actual sickness and mortality but the sickness and mortality on the supposition of the quarters being of equal length. The mean temperature, the fall of rain, the mean dew point, and the mean height of the barometer are also added.

TABLE I.

	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.
Mortality of the Metropolis	12,805	10,494	11,177	11,915
Mortality of the Central Districts . .	2,510	2,148	2,183	2,345
Sickness of the western part of the same Districts	2,030	2,373	2,571	2,080
Mean temperature	41·3	57·2	64·1	46·5
Rain in inches	3·695	3·034	9·192	6·011
Dew point (mean)	38°	50°	58°	43°
Mean height of barometer in inches . .	29·914	29·937	29·876	29·885

The relation in which the sickness and mortality stand to the various states of the atmosphere will be best seen in the following Table, in which the quarters indicated by the numbers 1, 2, 3, 4, are arranged in the order of the sickness and mortality, and of the temperature, moisture, and pressure of the air.

TABLE II.

	Order of the Quarters.			
Mortality of the Metropolis	1	4	3	2
Mortality of the Central Districts . .	1	4	3	2
Sickness of the western part of the Central Districts	3	2	4	1
Thermometer (mean)	3	2	4	1
Dew point (mean)	3	2	4	1
Rain in inches	3	4	1	2
Barometer (mean)	2	1	4	3

From this Table it appears that there is no relation, whether direct or inverse, between the mortality and any single condition of the air, but that the sickness follows the exact order of the temperature and dew-point, varying directly as each of them.

Having thus obtained a clue to a relation existing between certain conditions of atmosphere and one branch of the present enquiry, viz., sickness, it will be desirable to follow this up first, leaving the question of mortality for after consideration.

The enquiry which first suggests itself is, whether every form of sickness follows the same rule, or whether the general result is determined by some one or more disorders peculiarly dependant upon atmospheric influences? this question is resolved by the following Table, in which the principal diseases are thrown into groups.

TABLE III.

Forms of Disease.	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.
Febrile affections*	45	93	132	73
Catarrhal affections†	103	137	159	115
Contagious exanthemata	11	34	44	28
Scrofula, gout, dropsy, &c.	63	85	90	65
Disorders of the digestive organs . .	247	328	489	250
Total . . .	469	677	914	531
Diseases of the organs of respiration .	419	279	250	319
Rheumatic affections	88	143	134	142
Diseases of the nervous system . . .	134	170	133	122
,, skin	184	285	251	205
Inflammation and its consequences . .	183	169	167	135
Other diseases‡	553	606	659	620
Total . . .	2,030	2,329	2,508	2,074
Accidents, tumours, malformation, &c. .	198	225	261	187
Grand Total . . .	2,228	2,554	2,769	2,261

* Including infantile fever.

† Including cases entered in great excess in the summer months under the head of debility.

‡ Including diseases of the circulating and urinary organs, which were entered among the out-patients in numbers too small to be of any use in the present inquiry; also venereal diseases, diseases of the osseous system and of the organs of sense, as well as those of females, which latter follow the same order as those of the nervous system.

To render the results of this Table more apparent, a second Table is added similar to the one already given, and exhibiting at a glance the order of the several quarters in respect of sickness, beginning with that in which the sickness is greatest.

TABLE IV.

Forms of Disease.	Order of the Quarters.			
Febrile affections				
Catarrhal affections				
Contagious exanthemata	3	2	4	1
Scrofula, gout, dropsy, &c.				
Disorders of the organs of digestion . .				
Diseases of the organs of respiration . .	1	4	2	3
Rheumatic affections	2	4	3	1
Diseases of the nervous system . . .	2	1	3	4
,, skin	2	3	4	1
Inflammation and its consequences . .	1	2	3	4
Other diseases	3	4	2	1
Accidents, &c.	3	2	1	4

It would appear then that the disorders which determine the order of the quarters in respect of sickness, or which may be said to govern the law of sickness, are the febrile affections, catarrh, the contagious exanthemata, and disorders of the digestive organs; to which may be added the mixed class, consisting of scrofula, gout, dropsy, &c.

The diseases of the organs of respiration follow precisely the inverse order of those already named; and it will be presently shown that these are the diseases which chiefly govern the order of mortality.

On comparing the fourth with the second Table, it will be seen that, with the exception of the diseases already specified, (febrile and catarrhal affections, contagious exanthemata, disorders of the digestive organs, and the mixed group, including scrofula, gout, dropsy, &c. on the one hand, and the diseases of the organs of respiration on the other,) there is no relation between any other disease named in the Table, and any one condition of atmosphere. Limiting our attention, then, to those diseases in which such a relation has been shown to exist, it will be interesting to inquire whether that relation which exists with regard to the quarters, holds good also with regard to the weather, for it might happen that the temperature and hygrometric state of the air were themselves merely coincident with something peculiar to the several quarters, irrespective of all those atmospheric conditions which can be measured by instruments.

To determine this point in respect of the temperature, I have prepared the following table, in which the months are arranged in the order of their temperature, beginning with the hottest month; and the number of diseases is stated for each month, and for periods of two months and three months respectively. The mixed group of diseases, which vary directly as the temperature are placed above, and the diseases of the organs of respiration, which vary inversely as the temperature, below the line showing the order of the months.

TABLE V.—*Diseases varying directly as the Temperature.*

Three months.	869			708			516			487		
Two months .	630		541		406		347		341		315	
One month .	363	267	239	302	216	190	193	154	169	172	172	143
	Aug.	June.	July.	Sept.	May	Oct.	April.	March.	Dec.	Nov.	Feb.	Jan.
One month .	74	83	81	95	99	123	97	124	80	116	146	149
Two months .	157		176		222		221		196		295	
Three months.	238			317			301			411		

Diseases of the Organs of Respiration, varying inversely as the Temperature.

From this Table it would appear that though the greatest amount of sickness in the mixed group occurs in the hottest month, and the least in the coldest, and inversely the least amount of disease of the organs of respiration in the hottest, and the greatest amount in the coldest month, there is no uniform relation between either class of disease and the temperature taken month by month. This may arise in part from the small number of cases entered during each month, (an explanation which applies more particularly to the diseases of the organs of respiration,) and partly to some disturbing cause. That the small number of facts affords some explanation of the want of uniformity is rendered probable by the progressive decrease which is observed in the mixed group, when the diseases of two months, and of three months respectively, are added together. But in the case of the diseases of the organs of respiration, no such progression is observed, even where the cases are taken by periods of three months. It might be presumed, therefore, that the influence of temperature on the mixed group of diseases was much more considerable than on those of the organs of respiration. But here it is necessary to advert to an obvious difference existing between the two classes of disease, viz., that the former are, with few exceptions, acute disorders, of which the commencement dates from a few days before the application for relief, whilst of the latter more than a half consists of cases of pulmonary consumption, an essentially chronic disease, and one for which the sufferers apply for relief at every step of its progress. To render the comparison between the mixed group of diseases and those of the organs of respiration a fair one, we must, therefore, subtract this large class of chronic diseases, and limit our enquiry to those acute affections which are likely to be more immediately dependent upon atmospheric conditions and changes. The result of this elimination is shown in the following Table, in which, as before, the months are arranged in the order of their temperature, beginning with that in which the temperature is highest.

TABLE VI.

	Aug.	June.	July.	Sept.	May.	Oct.	April.	March.	Dec.	Nov.	Feb.	Jan.
One month .	43	45	37	61	50	86	60	80	63	89	102	102
Two months .	88		98		136		140		152		204	
Three months.	125			197			203			293		

Here, as in the case of the mixed class of diseases, there is no uniform relation existing between the temperature and the diseases of the organs

of respiration, taken month by month, but when the months are taken by twos and threes there is found to be a progressive increase from August to January. The excess, however, in the two months of March and April over the two months of May and October is so slight that it would be unsafe to affirm that the uniformity may not be due to a coincidence; and the same remark applies to the excess of the third quarter over the second. The great difference existing between the months at the two extremes of the table, viz. January and August, establish beyond a doubt the great influence of the temperature upon this class of diseases, but it is still to be shown that this influence is of so marked a character as to make itself felt in short intervals of time.

From the first table it appeared that besides the coincidence between the temperature and the number of diseases, there was also a coincidence between the dew point and the amount of sickness. This is at once explained by comparing the temperature and dew-point, which are found to coincide for nine months out of the twelve, and to differ only in those months between which the range of temperature does not exceed three degrees. The one condition of atmosphere, indeed, is closely dependent upon the other; so that the observations which apply to the one, hold good with regard to the other also.

In consequence of this close correspondence between the temperature and the hygrometric state of the air as indicated by the dew-point, it is obviously possible to attribute the relation which exists between the sickness and those two atmospheric conditions to either of them. It is necessary, therefore, to determine how far the sickness coincides with the hygrometric state of the air. Now the dew point taken alone is not a measure of the quantity of moisture which the air contains; the true measure being the elasticity of vapour at the real atmospheric temperature divided by the elasticity at the dew point; the quotient expressing the quantity of aqueous vapour contained in the air. The result of this calculation is shown in the following table, in which the mean quantity of moisture for each quarter is given, and contrasted with the amount of sickness.

TABLE VII.

	First Quarter.	Second Quarter.	Third Quarter	Fourth Quarter.
Moisture	878	804	830	860
Diseases	2,030	2,375	2,571	2,080

A glance at this table will show that there is no relation existing between the hygrometric state of the air, taken separately, and the prevalence of sickness, and this will appear still more strikingly in the following table, in which the months, arranged in the order of the quantity of moisture contained in the air, beginning with that in which the moisture is at a maximum, are compared with the number of cases belonging to the mixed group of diseases and to the diseases of the organs of respiration.

TABLE VIII.—*Diseases belonging to the Mixed Group.*

Three months .	617			534			583			846		
Two months .	445		341		365		344		455		630	
One month .	302	143	172	169	172	193	190	154	239	216	267	363
	Sept.	Jan.	Feb.	Dec.	Nov.	April.	Oct.	March.	July.	May.	June.	Aug.
One month .	61	102	102	63	89	60	86	80	37	50	45	43
Two months .	163		165		149		166		87		88	
Three months.	265			212			203			138		

Diseases of the Organs of Respiration.

From this table it would appear that though the hygrometric state of the air exercises no marked influence on the mixed class of diseases already described, it has some effect on the diseases of the organs of respiration, which are most numerous when the quantity of moisture in the air is at a maximum. It must be borne in mind, however, that two out of the three months in which there is most moisture in the air are also two of the coldest months of the year, and that the three in which there is least moisture, viz. May, June, and August, are also three of the hottest months. It is also worthy of remark, that the diseases of the organs of respiration occurring in the month of September, in which the air is most saturated with moisture, form scarcely three-fourths of the number occurring in the colder months of January and February, which follow next in order. The influence of the hygrometric state of the air on the diseases of the chest, therefore, is not of so marked a character as that of the temperature, which appears to be, beyond a doubt, the most influential cause of disease.

Such is the result, for the year 1842, of the cases registered at a large hospital, situate in the very centre of the metropolis. The returns of a single year cannot of course be held sufficient for the establishment of a general rule; but it would be difficult to select any one year more free than 1842 from those epidemic diseases which by their prevalence at particular seasons tend to interfere with, and to obscure, the influence of the ordinary atmospheric conditions and changes. The influenza, for example, which was so prevalent during the months of February and March of the year 1841, did not exist as a marked epidemic in 1842; and the latter year was also remarkably free from the contagious fever which threatens to be so rife and fatal during the present year. For the reason now assigned the return for the year 1842 may be fairly assumed to represent the march of sickness, when the influence of the seasons and weather is unmodified by the prevalence of epidemics.

There still remains to consider the influence of the seasons and weather on the mortality for the year 1842. It has been already shown, in Tables I. and II., that the mortality both of the metropolis and of the central districts in the several quarters of that year followed the order 1, 4, 3, 2; the maximum being in winter and the minimum in spring. The first point to be ascertained in this inquiry, as in that already made into the order of the quarters in respect of sickness, is what were the diseases which, following in this order, may be said to have governed the mortality. This will appear in the following table, which represents the mortality for each quarter, and the order of the quarters in respect of mortality, beginning with that in which the deaths were most nu-

merous. The table is taken from the Registrar-General's summary of the weekly tables of mortality for the metropolis for 1842.

TABLE IX.

Forms of Disease.	Number of Deaths.				Order of the Quarters.
	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.	
Diseases of the Organs of Respiration	4,259	3,159	2,821	3,751	1 4 2 3
Old Age	1,051	733	668	894	1 4 2 3
Diseases of Uncertain Seat* .	1,560	1,331	1,437	1,387	1 3 4 2
Other Diseases, in which the greatest mortality is in the first Quarter†	372	318	315	335	1 4 2 3
Epidemic, Endemic, and Contagious Diseases	1,841	1,588	2,231	2,036	3 4 1 2
Diseases of the Organs of Digestion.	806	715	1,117	758	3 1 4 2
Diseases of the Nervous System	1,918	1,831	1,944	1,812	3 1 2 4
Diseases in which the greatest mortality occurred in the Fourth Quarter‡	589	551	486	658	4 1 2 3
Total . . .	12,396	10,226	11,019	11,631	1 4 3 2

It results from this table that there was no class of diseases which followed the order of the total mortality; in other words there was no class of diseases that by the great difference in the mortality which it occasioned in the several quarters of the year might be said to determine or govern the total mortality. It will be seen, however, that the deaths from diseases of the organs of respiration and from old age followed the order of the total mortality, except that the second and third quarters were inverted, and that there was so great a difference in their fatality in the several quarters that they must of necessity have exercised a marked influence on the order of the total mortality. The excess of deaths from diseases of uncertain seat in the first quarter, added to the still greater excess of deaths from diseases of the organs of respiration and from old age, gave to that quarter a decided predominance over all the others. In four out of eight of the classes in the table, indeed, the first quarter stands first in point of mortality. Again in the case of the fourth quarter, which ranks next in point of mortality, the large class of epidemic, endemic, and contagious diseases reinforces the mortality from diseases of the lungs and old age, and gives to that quarter a decided excess over the second and third. All that remains, then, is to explain how it happened that the summer quarter proved more fatal than the spring quarter in spite of the excess of deaths from the diseases of the lungs and from old age, which occurred during the spring. The explanation is found in the great excess of deaths from diseases of the

* Including inflammation and its consequences, hæmorrhage, dropsy, scrofula, scurvy, gout, atrophy, debility, &c. &c.

† This class includes most diseases of the skin, and deaths from intemperance, starvation, and violence.

‡ Including deaths from diseases of the organs of circulation, of the urinary organs; from rheumatic affections, from childbirth, and from diseases not specified.

organs of digestion, from epidemic, endemic, and contagious diseases, and from the diseases of the nervous system, but especially of the two former classes, which took place in the summer months. Were it not for this excessive mortality during the summer months, the deaths from diseases of the chest, coupled with those from old age, would have governed the mortality; and it is highly probable that if a severe winter were to coincide with a mild summer, this would prove to be the case.

It has already been shown that during the year 1842 the total sickness varied directly, and the diseases of the chest inversely as the temperature. Hence on the supposition that the diseases of the chest had been found to determine the mortality, the deaths would have been inversely as the temperature, being at a maximum in winter, and at a minimum in summer. But the great mortality attendant upon the diseases of the organs of digestion, and on the epidemic, endemic, and contagious diseases, during the summer months, interfered with, and formed an exception to, this simple law of mortality.

From the foregoing considerations, then, it follows that during the year 1842, the atmospheric condition which exercised the most marked influence on sickness and mortality was temperature, and it may be stated generally that the total sickness varied directly, and the mortality tended to vary inversely as the temperature.

Such are the conclusions drawn from an examination of the sickness and mortality of one year. How far these conclusions apply to other years is a question of considerable interest, which I proceed to examine by the aid of such materials as I have been able to obtain. In prosecuting this inquiry I have found it necessary to adopt a different division of the year from that employed for 1842. In the case of any single year, and for ordinary purposes, the simple division into quarters is the best, and it is that adopted by the Registrar-General. But for the purpose of determining the relation existing between sickness and mortality, on the one hand, and the seasons and weather, on the other, a different division of the year is required, and it happens fortunately for the present inquiry that the most complete series of reports which I have been able to obtain adopts the division best adapted to this purpose. It is a division into seasons: December, January, and February, constituting the winter; March, April, and May, the spring; June, July, and August, the summer; September, October, and November, the autumn.

The advantage of this division into seasons over that into quarters is made to appear by contrasting the average temperature of the five years from 1838 to 1842 inclusive for the quarters and seasons respectively. The average temperature of the several quarters and seasons, with the differences existing between each successive quarter and season, is shown in the following table, which I introduce to show the great superiority of the division into seasons over that into quarters.

TABLE X.

Seasons.	Average Temperature.	Difference.	Quarters.	Average Temperature.	Difference.
Winter (Dec., Jan., Feb.)	38·8	12·6	1st Qr. (Jan., Feb., Mar.)	42·9	1·9
Spring (Mar., Apr., May.)	48·6	9·8	2d Qr. (Apr., May, June.)	55·1	12·2
Summer (June, July, Aug.)	63·5	14·9	3d Qr. (July, Aug., Sept.)	62·1	7·0
Autumn (Sept., Oct., Nov.)	51·4	12·1	4th Qr. (Oct., Nov., Dec.)	44·8	17·3

A glance at this table will suffice to show the great superiority of the division into seasons over that into quarters. For instance, the difference in point of temperature between the winter and autumn seasons is 12·6, while between the first and fourth quarter it is only 1·9. Again the differences between the seasons taken one with the other are much more uniform than those between the several quarters, the greatest difference in the case of the seasons exceeding the least difference by only 5 degrees, whilst the greatest difference in the case of the quarters exceeds the least by no less than 15 degrees. Hence there can be no doubt that the most natural and useful division of the year is that into seasons.

There is another division of the year which may be usefully employed in examining the influence of temperature upon health; viz., into the four hottest, the four coldest, and the four temperate months, the four hottest being June, July, August, and September; the four coldest December, January, February, and March; and the four temperate months April, May, October, and November. The average of the four hottest months for the five years ending with 1842, is 62·3°, that of the four coldest 40°, and that of the four temperate months 49·4°. This division, as well as that into seasons, will be made use of in the remainder of the present inquiry.

Two questions still remain for discussion:—1. Whether the same order of the seasons in respect of sickness and mortality obtains every year; and, 2. Whether the amount of sickness and mortality in different years, and in the several seasons of different years, like that at different seasons of the same year, depends upon the temperature.

Commencing as before with the sickness, I propose to examine each of these questions in turn, and

1. Does the same order of the seasons in respect of sickness obtain every year?

The registries of King's College Hospital, in consequence of the recent establishment of the charity, only extend to two complete years,* in each of which the same order of the seasons is found to prevail, the numbers being as follow:—

TABLE XI.†

Years.	Winter.	Spring.	Summer.	Autumn.	Order of the Seasons.
1841	1,915	1,999	2,365	2,176	3 4 2 1
1842	2,192	2,364	2,776	2,469	3 4 2 1

I am so fortunate as to be able to throw additional light upon this question by making use of the registers of sickness at the St. Giles's Parochial Infirmary; which registers have been carefully kept during the years 1838, 1839, 1840, 1841, and 1842, and in which are entered all the cases of sickness occurring in the infirmary, in the workhouse, among the out-patients applying for relief, and among those visited at their own homes.‡ These registers, though obviously imperfect repre-

* Each year is supposed to begin with December of the previous year.

† When the months are arranged by quarters, the two years do not correspond, but the second and third quarters change places.

‡ I am indebted for these facts to the kindness of my friend and neighbour, Dr. James Reid.

sentatives of the average sickness, inasmuch as the pauper patients are in excess during those seasons when there is a scarcity of employment, present, nevertheless, a fair comparative view of the distribution of sickness over the seasons of the different years.

The diseases occurring in the several seasons of each year, and the order of the seasons, are shown in the following table :—

TABLE XII.

Years.	Winter.	Spring.	Summer.	Autumn.	Order of the Seasons.
1838	1,804	1,909	1,936	1,761	3 2 1 4
1839	1,913	1,763	2,050	1,979	3 4 1 2
1840	2,009	2,040	2,008	2,009	2 1 4 3
1841	1,969	1,785	1,778	2,019	4 1 2 3
1842	2,344	2,306	2,621	2,869	4 3 1 2
Mean of the 5 Years .	2,008	1,961	2,079	2,127	4 3 1 2

This table at once decides the question under examination in the negative. There is not only no uniform order of the seasons in respect of sickness, but each of the five years has its own order. In two instances also (those of 1838 and 1841, and of 1839 and 1840), the order of the seasons is inverted. The average of the five years follows the order of the year 1842.

Dr. Bateman's admirable reports of the Carey Street Dispensary* have furnished me with a still more extensive series of facts illustrative of the same question. In these reports the year is divided into seasons, as in the two preceding tables.

TABLE XIII.—*Showing the Number of Patients treated at the Carey Street Dispensary during the several Seasons of the undermentioned Years, with the order of the Seasons.*

Years.	Winter.	Spring.	Summer.	Autumn.	Order of the Seasons.
1805	460	443	507	465	3 4 1 2
1806	502	513	509	474	2 3 1 4
1807	549	538	505	432	1 2 3 4
1808	506	553	507	464	2 3 1 4
1809	478	582	430	470	2 1 4 3
1810	548	545	542	528	1 2 3 4
1811	575	585	533	546	2 3 4 1
1812	527	612	620	594	3 2 4 1
1813	595	638	677	703	4 3 2 1
1814	703	670	581	603	1 2 4 3
1815	662	697	648	632	2 1 3 4
Average of 11 Years	555	579	551	537	2 1 3 4

Two coincidences occur in this table; one between the years 1806 and 1808; the other between the years 1807 and 1810; the order of the

* Published in the early numbers of the Edinburgh Medical and Surgical Journal. This dispensary is situate in the same street as the King's College Hospital.

seasons in the former case being 2, 3, 1, 4, and in the latter 1, 2, 3, 4. In the years 1805 and 1809, the order of the seasons is inverted, and the year 1813 presents the inverse order of the years 1807 and 1810. The other years present every possible variety, whilst the maximum sickness occurs twice only in summer, and the minimum three times only in winter. The average of the 11 years places the seasons in the order 2, 1, 3, 4.

The absence of uniformity in the order of the seasons becomes still more apparent on comparing the three preceding tables with each other; for the order of the seasons in the King's College Hospital Reports does not correspond with any single year in the two last tables; and the two last tables themselves exhibit only two coincidences, viz., between the years 1805 and 1839, and between the years 1809 and 1840.

It follows, then, from the foregoing facts, that there is no uniform order of the seasons in respect of sickness, but that the numbers which represent their sequence assume every possible arrangement, and admit of every possible combination.

It may be interesting to inquire how far the several years correspond when the months are thrown into three groups consisting of the four hottest, the four coldest, and the four temperate months. This will appear in the following table, formed from the registries of the St. Giles's Parochial Infirmary.

TABLE XIV.

Years.	1 4 Hottest Months.	2 4 Temperate Months.	3 4 Coldest Months.	Order.
1838	2,535	2,513	2,362	1 2 3
1839	2,734	2,508	2,463	1 2 3
1840	2,794	2,560	2,712	1 3 2
1841	2,444	2,466	2,641	3 2 1
1842	3,587	3,280	3,273	1 2 3
Average of the 5 years	2,819	2,665	2,690	1 3 2

Here, again, there is a want of uniformity in the several years. The greatest amount of sickness occurs in the hottest months, and the least in the coldest, in three out of the five years, viz., in the years 1838, 1839, and 1842; the maximum sickness occurs also in the four hottest months in the year 1840; but in the year 1841, the maximum sickness is in the four coldest months, and the minimum in the four hottest. The excess of sickness in the coldest months of 1841 is readily explained by the great prevalence of influenza during the months of February and March of that year, and the proportional increase of diseases of the chest. The effects of this severe epidemic extending into the months of April and May also accounts for the slight excess of sickness during the temperate months over that occurring in the four hottest months. Omitting this exceptional year, it will be seen that the maximum sickness occurs in all the remaining years during the four hottest months, and this, too, in an institution in which the class of patients relieved is naturally in excess during the colder months. This table, then, gives strong con-

firmation to the results deduced from the King's College Hospital Report for 1842.

2. Does the amount of sickness in different years, and in the same season of different years, depend upon the temperature?

The last table, as has just been stated, seems to justify an answer in the affirmative, as in four out of five years, and in the average of the five years, it exhibits an excess of sickness in the hottest months. With a view of throwing additional light upon the question, I subjoin two tables, exhibiting for the Carey Street Dispensary, and St. Giles's Parochial Infirmary, the total sickness and mean temperature of each year, and contrasting the per centage proportion which the diseases of each season bear to the total sickness of the year with the mean temperature of the several seasons.

TABLE XV.—*From the Reports of the Carey Street Dispensary.*

Year.	Dec., Jan., Feb.		Mar., Apr., May.		June, July, Aug.		Sept., Oct., Nov.		Total for each Year.	
	Mean Temperature.	Cases of Sickness.	Mean Temperature.	Cases of Sickness.	Mean Temperature.	Cases of Sickness.	Mean Temperature.	Cases of Sickness.	Mean Temperature.	Cases of Sickness.
1805	39·7	24·53	48·6	23·62	61·8	27·04	51·2	24·80	50·5	1,875
1806	45·1	25·12	49·3	25·67	64·1	25·48	54·3	23·72	53·2	1,998
1807	40·0	27·12	48·7	26·58	65·4	24·95	50·6	21·34	51·2	2,024
1808	38·5	24·92	48·5	27·28	65·5	24·97	50·8	22·85	50·8	2,030
1809	42·3	24·39	49·5	29·69	62·4	21·94	50·8	24·00	51·3	1,960
1810	39·3	25·33	49·4	25·19	63·7	25·06	53·8	24·41	51·5	2,163
1811	39·2	25·68	53·0	26·12	63·2	23·80	55·3	24·38	52·7	2,239
1812	39·5	22·40	47·2	26·01	59·8	26·35	50·3	25·24	49·2	2,353
1813	39·4	22·77	49·2	24·41	60·7	25·91	49·7	26·90	49·7	2,613
1814	35·7	27·49	46·7	26·20	60·7	22·72	49·9	23·58	48·2	2,557
1815	38·8	25·67	51·7	27·02	62·7	25·12	53·0	24·50	51·6	2,579

The figures in this table are by no means so confirmatory of the influence of temperature on sickness as might have been anticipated, for on comparing the total sickness of the several years the maximum average temperature is found to coincide with a comparatively small amount of sickness, whilst the minimum temperature coincides with one of the most sickly years. Again the sum of the cases of sickness in the five years in which the mean temperature was the highest is found to be less than the sum of the cases in the five years in which the temperature was lowest; the numbers being for the five years of highest temperature, with an average temperature of 52·1, 2,188, and for the five years of lowest temperature, with an average temperature of 49·7, 2,286, a difference of about 5 per cent.

If we extend our examination to the several seasons in succession, we can discover no uniform relation between the amount of sickness and the average temperature. Thus though in the winter season, during which the sickness may be expected to be inversely as the temperature, we find an excess of sickness in the five colder winters over the five milder winters, amounting to about 4 per cent.; on turning to the summer season we find the same average amount of sickness in the five hottest and in the five coldest summers. In the spring and autumn seasons,

however, the greatest amonut of sickness will be seen to coincide with the greatest temperature. Thus, in spring, the five years in which the mean temperature is the highest, viz., 50·6, present an average of 26·74 per cent. of sickness, whilst the five years in which the temperature is lowest, viz., 47·9, yield an average of 25·94 per cent. The difference in the autumn season is less considerable, but here also in favour of the hotter seasons.

TABLE XVI.—*From the Returns of the Parochial Infirmary of St. Giles.*

Years.	Dec., Jan., Feb.		Mar., Apr., May.		June, July, Aug.		Sept., Oct., Nov.		Total for each Year.	
	Mean Temperature.	Cases of Sickness.	Mean Temperature.	Cases of Sickness.	Mean Temperature.	Cases of Sickness.	Mean Temperature.	Cases of Sickness.	Mean Temperature.	Cases of Sickness.
1838	35·3	24·34	47·4	25·76	62·1	26·12	50·6	23·63	48·8	7,410
1839	40·0	24·82	45·4	22·88	62·6	26·61	51.6	25·68	49·9	7,705
1840	38·2	24·91	47·8	25·29	64·0	24·89	50·4	24·91	50·1	8,066
1841	38·9	26·08	38·9	23·64	61·9	23·55	53·3	26·73	48·2	7,551
1842	41·2	23·11	41·2	22·74	66·8	25·84	50·9	28·29	50·0	10,140

This table gives greater support than the preceding one to the opinion that the temperature has a marked influence on the prevalence of sickness, for while there is an increase of sickness in the colder winters, and a well-marked excess of sickness in the warmer summers, the total of cases of sickness in the several years corresponds pretty closely with the temperature of those years.

The comparison which has just been instituted between the several years during which returns have been made for the Carey Street Dispensary, and the St. Giles's Parochial Infirmary, does not admit of being extended to the King's College Hospital, on account of its comparatively recent establishment, and the increase which is still taking place in the applications for relief.

I now proceed to inquire whether the order of the quarters, (for in consequence of the Registrar-General's reports being made up by quarters, I am obliged to return to this division of the year,) in regard to mortality, is the same in the four preceding years as in 1842. That in this respect, as in the prevalence of sickness, there is a want of uniformity, will appear in the following tables, which exhibit the mortality for the metropolis and for the central districts respectively, in the several quarters from 1838 to 1842 inclusive.

TABLE XVII.—*Metropolis.*

Years.	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.	Order of the Quarters.
1838	15,611	13,109	11,397	12,581	1 2 4 3
1839	11,778	11,023	11,236	11,404	1 4 3 2
1840	11,656	10,836	11,137	12,725	4 1 3 2
1841	13,713	10,404	10,406	10,761	1 4 3 2
1842	12,805	10,494	11,177	11,915	1 4 3 2
Total .	65,563	55,866	55,353	59,386	1 4 2 3

TABLE XVIII.—*Central Districts.*

Years.	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.	Order of the Quarters.
1838	3,292	2,683	2,239	2,630	1 2 4 3
1839	2,447	2,355	2,523	2,426	3 1 4 2
1840	2,400	2,112	2,132	2,514	4 1 3 2
1841	2,925	2,170	2,152	2,086	1 2 3 4
1842	2,510	2,148	2,183	2,345	1 4 3 2
Total	13,574	11,468	11,229	12,001	1 4 2 3

The first table, which represents the total number of deaths in the metropolis, exhibits a much closer correspondence between the results of the several years than does the second table; the order of the quarters being the same in the years 1839, 1841, and 1842, the first quarter being the most and the second the least fatal in four out of the five years, whilst the summer quarter ranks fourth in point of fatality in every year but one. The table of mortality for the central districts, on the other hand, is much less uniform, the winter proving most fatal, the spring least fatal, and the summer ranking third in point of fatality in three out of the five years. The average result of each table, however, is the same, the order of the quarters being 1, 4, 2, 3.

The following table, extracted from the Registrar-General's Report for 1842, shows that for the entire kingdom the order of the quarters in respect of mortality is different from that of the metropolis, but the same for each of the three years.

TABLE XIX.

Years.	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.	Order of the Quarters.
1838	98,114	90,810	72,791	80,816	1 2 4 3
1839	89,739	87,965	76,280	84,995	1 2 4 3
1840	98,843	90,339	80,820	89,630	1 2 4 3

It would appear, then, that on an average of a number of years the mortality for the metropolis corresponds with that for the entire kingdom, inasmuch as the first quarter is the most fatal, and the third the least fatal; but that the place of the second and fourth quarters is inverted, the autumn being most fatal in the metropolis and the spring in the country generally.

There now only remains to consider the relation existing between the temperature and mortality of the several years and seasons of each year. This will be best seen in the following table, which exhibits the mean temperature and per centage proportion of deaths for the several seasons, also the total for each year.

TABLE XX.

Years.	First Quarter.		Second Quarter.		Third Quarter.		Fourth Quarter.		Year.	
	Mean Temperature.	Number of Deaths.	Mean Temperature.	Number of Deaths.	Mean Temperature.	Number of Deaths.	Mean Temperature.	Number of Deaths.	Mean Temperature	Number of Deaths.
1838	35·3	29·62	47·4	24·88	62·1	21·62	50·6	23·87	48·8	52,698
1839	40·0	25·92	45·4	24·25	62·6	24·72	51·6	25·09	49·9	45,441
1840	38·2	25·14	47·8	23·37	64·0	24·02	50·4	27·45	50·1	46,354
1841	38·9	30·28	51·9	22·97	61·9	22·97	53·3	23·76	48·2	45,284
1842	41·2	27·60	50·2	22·62	66·8	24·09	50·9	25·68	50·0	46,391

In this table the relation existing between a cold winter and a high mortality is apparent; in the spring and autumn the greatest mortality is also in the coldest seasons; while in summer the maximum mortality coincides with the maximum temperature. For the entire year the influence of temperature is still more marked, by far the greatest mortality being in the year in which the winter was the most severe. To these statements, however, there are some exceptions. The relative mortality, for instance, in the first quarter of the year 1841 is greater than in that of 1838, though the winter of 1838 was much the more severe. This is explained by the severe epidemic of influenza which occurred in the early months of 1841, and caused a mortality disproportioned to the severity of the weather.

The results to which the foregoing facts and reasonings lead may be briefly stated as follows:—

1. The amount of sickness in the central districts of London during the year 1842 varied directly as the temperature, being a maximum in August, the hottest month of the year, and a minimum in January, the coldest month.

2. The diseases which determined the order of sickness were febrile and catarrhal affections, the contagious exanthemata, and the disorders of the digestive organs; to which may be added the mixed group, consisting of gout, scrofula, &c.

3. The diseases of the organs of respiration followed the inverse order of those already mentioned, and were inversely as the temperature, being most numerous in the colder, and fewest in the hotter months.

4. The temperature did not appear to exercise a marked influence on the other classes of disease.*

5. The hygrometric state of the air appeared to have little effect on disease, and if it produced any effect it was on the diseases of the organs of respiration, which were in excess during the months in which the quantity of moisture in the air was the greatest; but these were also the coldest months.

6. The mortality for the metropolis during the year 1842, was greatest in the first quarter, and least in the second, and was inversely as the

* With the exception, perhaps, of those which form a measure of the activity of the sexual passion, which were in excess during the hottest months of the year; a fact which corresponds with, and corroborates our experience of the influence of the seasons on crimes against the person, &c.

sickness, except that the mortality of the third quarter exceeded that of the fourth.

7. The diseases which chiefly influenced the order of the quarters in respect of mortality, were those of the chest, to which may be added, as following the same order, the decay of nature in the aged.*

8. The order of the seasons in respect of sickness and mortality differs year by year, and does not admit of being reduced to any precise rule.

9. As a general rule, but one admitting of many exceptions, it may be stated, that the amount of sickness tends to vary directly, and the amount of mortality inversely as the temperature.

These results must be received with some reserve, as they are founded on a comparatively small number of facts; but they are probably not very far from the truth. At any rate they may prove suggestive of future enquiries, founded upon a broader basis. At present the materials for a comprehensive theory of the influence of the seasons and weather upon sickness and mortality are wanting, and are not likely to be supplied till the example set by one or two public hospitals and dispensaries shall have provoked imitation. In the mean time the present attempt, if it accomplish no other purpose, may serve as an example of the mode by which such enquiries must be conducted.

In the course of this enquiry it is scarcely possible, that some hypothesis should not have suggested itself as the most likely to prove true; and it may not be amiss to bring this attempt to a conclusion, by stating in few words that which I have been led to form.

The causes of sickness are twofold, consisting of atmospheric changes which may be submitted to measurement, and of certain more subtle changes in the composition of the air, which at present can neither be analysed nor estimated. To the former class belong the temperature, moisture, and pressure of the air; to the latter those emanations from the earth or from human beings themselves, which give rise to the majority of epidemic, endemic, and contagious diseases. As the number of cases of sickness produced by these latter causes is generally considerable, the influence of the pressure, temperature, and hygrometric state of the air will not be observed in those years in which these causes are in operation; but in the absence of epidemics, the temperature will be found to be the most influential cause of sickness. When the temperature of the summer is high, there will be such an amount of sickness in the summer months as to cause a large return of sickness for the entire year; so, on the other hand, a severe winter will swell the total sickness of the year, by producing a great excess of affections of the organs of respiration. A summer or winter of unusual length, beginning early and ending late, will also cause an increase of sickness on the entire year, but the nature of the sickness will be different as the temperature is higher or lower than usual. The order of the seasons in respect of sickness will also be mainly determined by the degree in which the temperature of these seasons exceeds, or falls short of, the average temperature.

The mortality, in like manner, in non epidemic years will be chiefly dependent upon the temperature, varying in the several seasons inversely

* It is well known that the most common cause of death in the aged, is an affection of the lungs, called "bronchitis senilis."

as the temperature, except in those years in which the summer is unusually warm, when the mortality of the summer may even exceed that of the winter season. In other instances, the mortality of the summer months will rank next to that of the winter or autumn.

It is only necessary to observe in conclusion, that as this attempt combines two of the most variable things in nature, the weather and the condition of the human body, it is scarcely to be expected that any more definite results than those now obtained should have been wrought out. As much has been done with the scanty materials at my command, as I expected to accomplish, and it formed no part of my plan to quote the results at which other enquirers had arrived. Suffice it to state that between this attempt and the labours of others there is that general correspondence which will render each confirmatory of the other.

Report of a Committee of the British Association for the Advancement of Science, consisting of Lieut.-Col. W. H. Sykes, F.R.S., Lord Sandon, M.P., G. R. Porter, Esq., F.R.S., J. Heywood, Esq., F.R.S., Dr. W. P. Alison, *and* E. Chadwick, Esq., *on the Vital Statistics of Large Towns in Scotland.*

[*Abstracted from the Transactions of the British Association for the Advancement of Science.*]

This Committee, in pursuance of a resolution of the General Committee of the British Association, at Glasgow, in 1840, selected the towns of Edinburgh with Leith, Glasgow, Aberdeen, Perth, and Dundee, as being those likely to supply the most useful materials for comparison, as well because of the circumstances in which they agree as of those in which they differ from each other. Mr. Alexander Watt, of Glasgow, who has established a claim to public respect by his mortality bills of Glasgow, and other statistical works, was good enough to undertake the severe labour of accumulating and digesting the facts contained in its report, which demanded of him no ordinary perseverance and tact to obviate the defects entailed by the very imperfect state of the registers of marriages, births, and deaths in Scotland. The results of his labours, when presented to the Committee, were found, indeed, to be embarrassing, not from any paucity of matter, but from their elaborateness and amount of detail, which precluded their publication in the annual volume of the transactions of the Association. The Chairman of the Committee, Colonel Sykes, appears, therefore, to have subjected the whole to a further laborious process of reduction, by which all the most valuable materials have been brought within the limits of 80 tables, and the like number of pages, in lieu of 119 tables and 199 pages. The Committee, in regretting the want of some systematic plan of registration in Scotland, for the purposes of vital statistics, express, nevertheless, a conviction that the facts accumulated open up a prospect of ascertaining, in the continued progress of their researches, certain physical laws in vital statistics, the knowledge of which may be of considerable importance, not only in the formation of more correct estimates of the value of life in different grades, and at different ages, but also in guiding the judgment of the legislator and the philanthropist in encountering the physical evils resulting from moral causes.